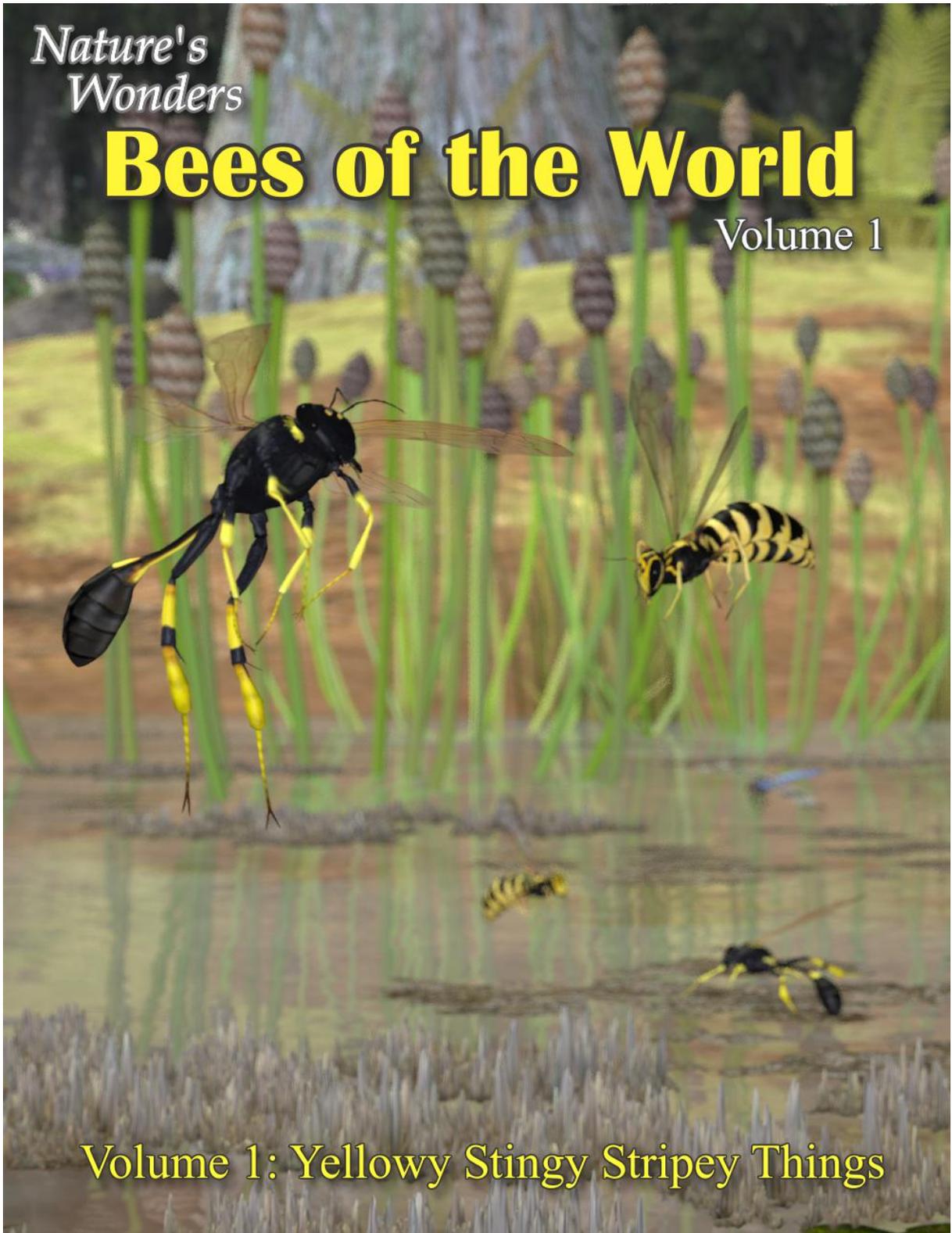


*Nature's
Wonders*

Bees of the World

Volume 1



Volume 1: Yellowy Stingy Stripey Things

A 3D Model set by Ken Gilliland

Nature's Wonders

Bees of the World

Volume 1

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Nature's Wonders

Bees of the World

Volume 1

Introduction

This volume is an add-on for the Nature's Wonders Bee Base set. It includes 6 species from the superfamily, *Apoidea*. This first volume of "Bees of the World" offers a wide offering of flying insects found throughout the world. The species have been carefully chosen to offer a little of everything, from the Short-haired Bumblebee of Eurasia to the Western Cicada Killer of Central and Western America to the Black-bellied Hornet found everywhere but Antarctic. In addition, there is a wasp, a mud dauber and a yellowjacket included to round out the set.

These six "Yellow-Stingy-Stripey-Things" are just what your renders need to be abuzz of excitement and detail. Bees of the World comes in both Poser and DAZ Studio native versions and support Firefly, 3Delight, Superfly and Iray render engines.

Overview and Use

This set uses a common model to recreate digitally the *Apoidea* species included in this volume. Each species uses specific morphs from the generic model to single-out its unique features. Select **Figures** in the Runtime Folder and go to the **Nature's Wonders Insects** folder:

- **Models Required to use this volume:**
 - **Natures Wonders Bee Base** - This model is sold separately at Hivewire3D.com and is **required** to use this product.

Creating a Bee using Poser

1. For this example, we'll create a Mud Dauber.
2. Load Poser, select the FIGURES library and go to the Nature's Wonders Insects folder.
3. To create a Mud Dauber, Go to the Animals / Nature's Wonders Insects / **Bees of the World** folder and the Firefly or Superfly sub-folder. Select the Mud Dauber.

Creating a Bee using DAZ Studio

1. For this example, we'll create a Mud Dauber.
2. Load DAZ Studio and go to the Animals / Nature's Wonders Insects / **Bees of the World** folder and select the sub-folder of which renderer you want to use, 3Delight or Iray. Select the Mud Dauber.



The InsectCam

All of the *Apoidea* species in this set have been scaled to their appropriate sizes in relation to human figure models. In most cases, these can be very small. With that in mind, this set comes with an "InsectCam".

The InsectCam is a camera set-up to focus on the default position of the insect. With Poser, it will also change the "hither" setting from its default value of 0.800 to 0.0 to allow close focus.

Sizing & Poser Issues

An issue that can appear when rendering in Poser, with only a bee (no other items) in the scene, is that it will produce a default square shadow. It is a known bug within Poser. To correct this issue, include a second larger item off-screen and the shadows will render correctly.

Poser's Superfly Renderer has trouble with overlaying transparency planes and can cause streaks and artifacts in the render. Using the "Physical Renderer Fix" morph and altering the hair morphs (in Creation Controls/Hair Controls) can help to minimize these issues. As a last resort, the "Hide Hair" controls turned to "1" (in Creation Controls/Hair Controls) remove the offending transparency planes and will resolve the issues.

Posing the Bee Model

With most figure-based models the center of the model is the "hip" area. The thorax is considered the "hip" in this model.

Nature's Wonders

Bees of the World

Volume 1

Short-haired Bumblebee

Western Cicada Killer

Black-and-Yellow Mud Dauber

Black-bellied Hornet

Common Wasp

Southern Yellowjacket

Short-haired Bumblebee

Bombus subterraneus

Range: It is found in Eurasia, as well as in New Zealand, where it is an introduced species. It lived in the British Isles among other parts of Europe. This species became extinct in the British Isles in 1989. The cause of the mass and sudden extinction is debated, but many scientists believe that it was due to a lack of genetic diversity. .

Habitat and Ecology: It is found in alpine grassland, open grassland and semi-desert areas. This species tends to favor Red clover (*Trifolium pratense*), honeysuckle (*Lonicera periclymenum*), white dead-nettle (*Lamium album*) and viper's-bugloss (*Echium vulgare*).



Queens search for nest sites during May. Nests are subterranean and mature during late August or early September.

Size: Total Length: worker adults 16-20 mm long; queens 20-24 mm long; drones 16-20 mm long.

Description: The species is very variable, with a white to buff-coloured tail and a yellow-black-yellow thorax (although the second band is sometimes lost in females). Males generally have two buff-colored bands on the abdomen though the extent of these varies from virtually non-existent to covering almost the entire abdomen. Queens and workers generally have a broad first yellow abdominal band and a narrower second band, though the extent of each of these varies.

Rarity and Status: It was one of four species of bumblebee introduced into New Zealand from the United Kingdom between 1885 and 1906 for pollination of red clover. In New Zealand, it is the rarest of the four species, with small numbers at a few locations in inland South Island. The last recorded sighting of *B. subterraneus* in the United Kingdom was in 1988 and it is believed extinct there. A program was started in 2009 to reintroduce it to the United Kingdom with queen bees from New Zealand. The program was run by Natural England, the Bumblebee Conservation Trust, the Royal Society for the Protection of Birds and bee and wasp charity, Hymettus. However, this was not a success, as many of the queens died during hibernation. DNA analysis of the New Zealand bees showed they lacked genetic diversity. In 2012, a second attempt was made to reintroduce the short-haired bumblebee using queens from Skåne province of southern Sweden. By the summer of 2013, workers of the species were found within 5 km of the reintroduction site, showing that nesting had been successful. The project continued collecting bumblebee queens from Skåne until the spring of 2016, to get a genetic span.

Western Cicada Killer

Sphecius grandis

Range: It is endemic to Central America, Mexico and the Western United States, and is found at a higher mean altitude than other species of *Sphecius*.

Habitat and Ecology: This ground-burrowing wasp may be found in well-drained, sandy soils to loose clay in bare or grass-covered banks, berms and hills as well as next to raised sidewalks, driveways and patio slabs. Females may share a burrow, digging their own nest cells off the main tunnel. A typical burrow is 25–50 cm (10–20 in) deep and about 1.5 cm (0.59 in) wide.



In digging a burrow, the female dislodges the soil with her jaws and, using her hind legs, pushes loose soil behind her as she backs out of the burrow. Her hind legs are equipped with special spines that help her push the dirt behind her. The excess soil pushed out of the burrow forms a mound with a trench through it at the burrow entrance. Cicada killers may nest in planters, window boxes, flower beds or under shrubs, ground cover, etc. Nests often are made in the full sun where vegetation is sparse.

Adults emerge in summer, typically beginning around late June or early July and die off in September or October. They are present in a given area for 60 to

75 days, usually until mid-September. The large females are commonly seen skimming around lawns seeking good sites to dig burrows and searching for cicadas in trees and taller shrubs.

The males are more often seen in groups, vigorously challenging one another for position on the breeding aggregation from which they emerged, and generally investigate anything that moves or flies near them. It is not unusual to see two or three male wasps locked together in apparent midair combat, the aggregate adopting an erratic flight path until one of the wasps breaks away. The male wasp's aggressive behavior is similar to that of another robust insect of the area, the male carpenter bee. In both cases, while the males' vigorous territorial defense can be frightening and intimidating to human passersby, the males pose no danger whatsoever. Male cicada killers will only grapple with other insects, and cannot sting.

They are solitary wasps and their behavior is very different from social wasps such as hornets, yellowjackets, and paper wasps. Cicada killer females use their sting to paralyze their prey (cicadas) rather than to defend their nests; unlike most social wasps and bees, they do not attempt to sting unless handled roughly. Adults feed on flower nectar and other plant sap exudates.

Size: Total Length: adults 30-50 mm long (females are larger than males).

Description: The western cicada killer is very similar to its eastern cousin, the Cicada Hawk (*Sphecius speciosus*), with a rufous black hue to the body, amber stripes and a yellow abdomen. The western cicada killer has rufous spots on its first to second tergites and yellow markings can generally be found from first to fifth, although there is some variation. On average, female forewing length lies between 2.5 and 3 cm (0.98 and 1.18 in) and females are larger than males. Females live for a year, a time just long enough to produce a brood, whereas the males die in only a few days, just enough time to impregnate a female.

It has been found that the western cicada killer wasp is capable of thermoregulation which enables them to maintain territories during the day.

Rarity and Status: This species is not threatened.

Black-and-Yellow Mud Dauber

Sceliphron caementarium

Range: It is widespread in Canada, the United States, Central America, South Africa and the West Indies. It has been introduced to Peru, Pacific Islands (Hawaii), Australasia (Australia and Japan), and Europe, where it has become established in some countries of the western Mediterranean Basin (Austria, Croatia, France, Italy, Cyprus, and Ukraine).

Habitat and Ecology: This species is found in a wide variety of habitats, such as rock ledges, man-made structures, puddles and other water edges, cypress domes, in long leaf pines (*Pinus palustris*), and in turkey oaks.



It build nests out of mud. They collect mud balls at puddle and pool edges. Frequently, nests are built in shaded areas inside formations that are sheltered from the weather or from other environmental elements. These sites may be naturally-occurring, or man-made structures. Some examples are: under and inside various types of bridges, barns, garages, open-air porches, or under housing eaves. The nests comprise up to 25 vertically arranged, individual cylindrical cells. After initial creation and covering of the clutch, this species wasp uses more mud as a means covering and protecting the whole cluster of cells, thereby forming a smooth appearance, and a uniform nest. The entire

nest may attain an area equal to, or larger than, the size of an average human fist.

After building a cell of the nest, the female wasp captures several spiders. The captured prey are stung and paralyzed before being placed in the nest (usually 6-15 per cell), and then a single egg is deposited on the prey within each cell. The wasp then seals the cell with a thick mud plug. After finishing a series of cells, she leaves and does not return. The larva spins a cocoon and pupates. Eventually, the hatching larva will eat the prey and emerge from the nest.

Adults can be seen in mid-summer feeding on nectar at flowers, especially Queen Anne's lace (*Daucus carota*), parsnips and water parsnips (*Sium suave*, *Sium latifolium*, *Berula erecta*). They have a low reproductive rate.

Stings are rare due to their usually peaceful nature, however nests are aggressively defended.

Size: Total Length: adults 24-28 mm long.

Description: The black and yellow mud dauber is a solitary parasitoid wasp. Their petiole is black and is about half the length of the entire abdomen. The thorax shows various yellow markings, while the abdomen is normally black, with yellow propodeum (typical of females). The eyes are black, the antennae are black, and the legs are yellow with black trochanters and femurs. The wings are a tawny color.

Rarity and Status: This species is not threatened.

Black-bellied Hornet

Vespa basalis

Range: The black-bellied hornet is a species native to Taiwan, but it also found in China, Nepal, India, Thailand, Myanmar, Sikkim, Vietnam, Sri Lanka, and Indonesia.

Habitat and Ecology: Adult hornets and their relatives (e.g., yellowjackets) feed themselves with nectar and sugar-rich plant foods. Thus, they can often be found feeding on the sap of oak trees, rotting sweet fruits, honey, and any sugar-containing foodstuffs. Hornets frequently fly into orchards to feed on overripe fruit. Hornets tend to gnaw a hole in fruit to become totally immersed in its pulp. A person who accidentally picks fruit with a feeding hornet can be attacked by the disturbed insect.



The adults also attack various insects, which they kill with stings and jaws. Due to their size and the power of their venom, hornets are able to kill large insects such as honey bees, grasshoppers, locusts, and katydids without difficulty.

Colonies may have as many as 5,000 individual hornets. **It is one of the most dangerous and aggressive species of hornet in the world.** The

venom possesses a potent edema-inducing activity, in addition to its lethal cardiovascular effect.

Size: Total Length: worker adults 20 mm long, males 24 mm long, queens 30 mm long.

Description: Hornets are specific types of wasp and are usually a little rounder and fatter than the common wasp. Like other social wasps, hornets build communal nests by chewing wood to make a papery pulp. Each nest has one queen, which lays eggs and is attended by workers that, while genetically female, cannot lay fertile eggs. Male hornets are docile and do not have stingers. Individual female hornets can sting repeatedly, unlike honey bees.

Rarity and Status: This species is not threatened. This hornet is popular as food in Southwest China.

Common Wasp

Vespula vulgaris

Range: The common wasp, is found in various regions, including the United Kingdom, Germany, India, China, New Zealand, and Australia.



Habitat and Ecology: The extraordinary adaptation skills of this wasp enable it to live in a wide range of habitats, from very humid areas to artificial environments such as gardens and human structures. This species, along with other wasp species such as *V. germanica*, has impacted the ecosystem, especially those in New Zealand and Australia, where they were imported by humans, and frequently cause damage to fruit crops and endanger humans.

It is a eusocial vespid that builds its gray paper nest in or on a structure capable of supporting it. A founding queen searches for a hollow tree, wall cavity, rock crevice, or even a mammal-made hole to build a nest. One colony cycle lasts for about 6–11 months and each colony cycle consists of around 3000–8000 larvae. Research indicates that these wasps use odor to identify and attack rival wasps from other colonies, and nest odor frequently changes.

Similarly to other wasps, it feeds on animal preys such as caterpillars to feed their developing larvae and carbohydrates, such as nectar and sweet fruits, to satisfy their own energy requirements. Their usual food sources are: wood pulp, freshly killed insects such as *Hymenoptera*, *lepidopteran larvae* and *Diptera* and Spiders. Common wasps will also attempt to invade honey bees' nests to steal their honey.

Size: Total Length: worker adults 12-17 mm long; queens 20 mm long.

Description: It has aposematic (warning) colors of black and yellow. The yellow pronotal bands are almost parallel to each other and black dots and rings on its abdomen. The queens and females appear very similar to *Vespula germanica*, except when they are seen head on (*V. vulgaris* face lacks the three black dots of *V. germanica*. Instead, each has only one black mark on its clypeus, which is usually anchor or dagger-shaped).

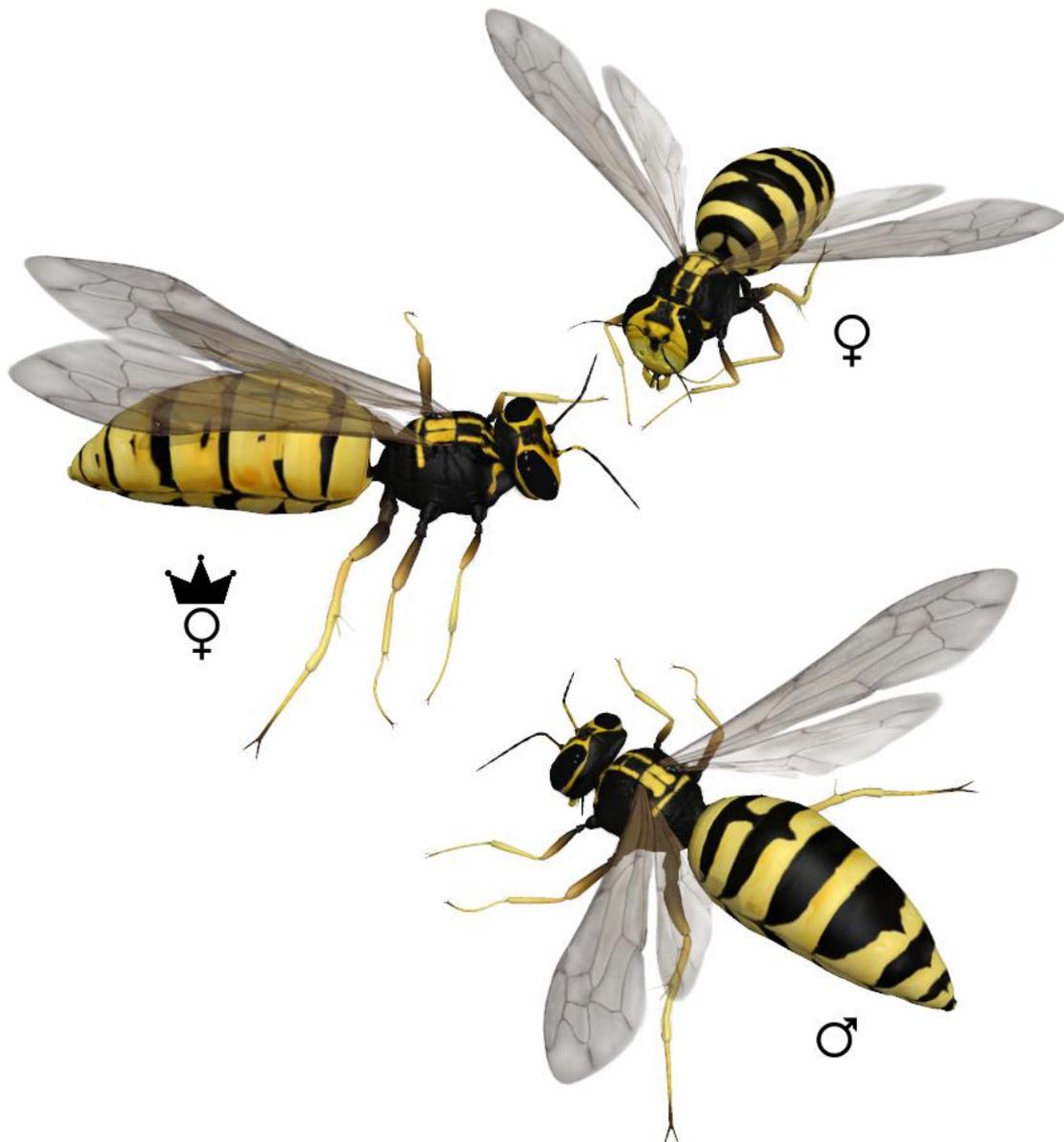
Rarity and Status: This species is not threatened. The common wasp is considered a pest species in New Zealand, as it directly predated native insects and competes with endemic species for food, such as insects and honeydew. In some South Island beech forests it is thought that densities of wasps are higher than anywhere else in the world. It is calculated that the total weight of common wasps in these places may exceed that of all birds.

Southern Yellowjacket

Vespula squamosa

Range: The southern yellowjacket is found in eastern United States and as far south as Mexico and Guatemala. Their territory expands as far west as Texas and as far east as the Atlantic Ocean. These areas tend to have fairly warm weather and in some cases, tropical climates.

Habitat and Ecology: Nests are typically found in unnatural habitats, such as yards, parks, and sides of roads. Some colonies, though, are found in pine forests. They create enormous, multiple-comb colony nests. The colonies may be either annual or perennial depending on the climate. In many perennial nests, polygyny takes place. This species uses pheromones both as a sexual attractant and an alarm signal.



This species is predatory and typically eats live insects, but they also feed on the flesh of deceased prey. They typically prey on arthropods, including spiders and caterpillars. For larvae to grow into the pupal state, adult workers find prey and bring food back for them. When establishing the colony, the queen goes out in search of nectar and insects for the larvae, as well. Yellowjackets do not produce honey.

Size: Total Length: female and male adults 12.5mm long; Queen 16.4mm long.

Description: It is a social wasp. This species can be identified by its distinctive black and yellow patterning and orange queen. Workers and males have similar black and yellow striped patterning, but the queen has fewer black markings and a more orange/brown coloring.

The southern yellowjacket is fairly closely related to *V. maculifrons* (Eastern Yellowjacket), and is a social parasite of that subspecies. It is also closely related to *V. rufa* (Red Wasp).

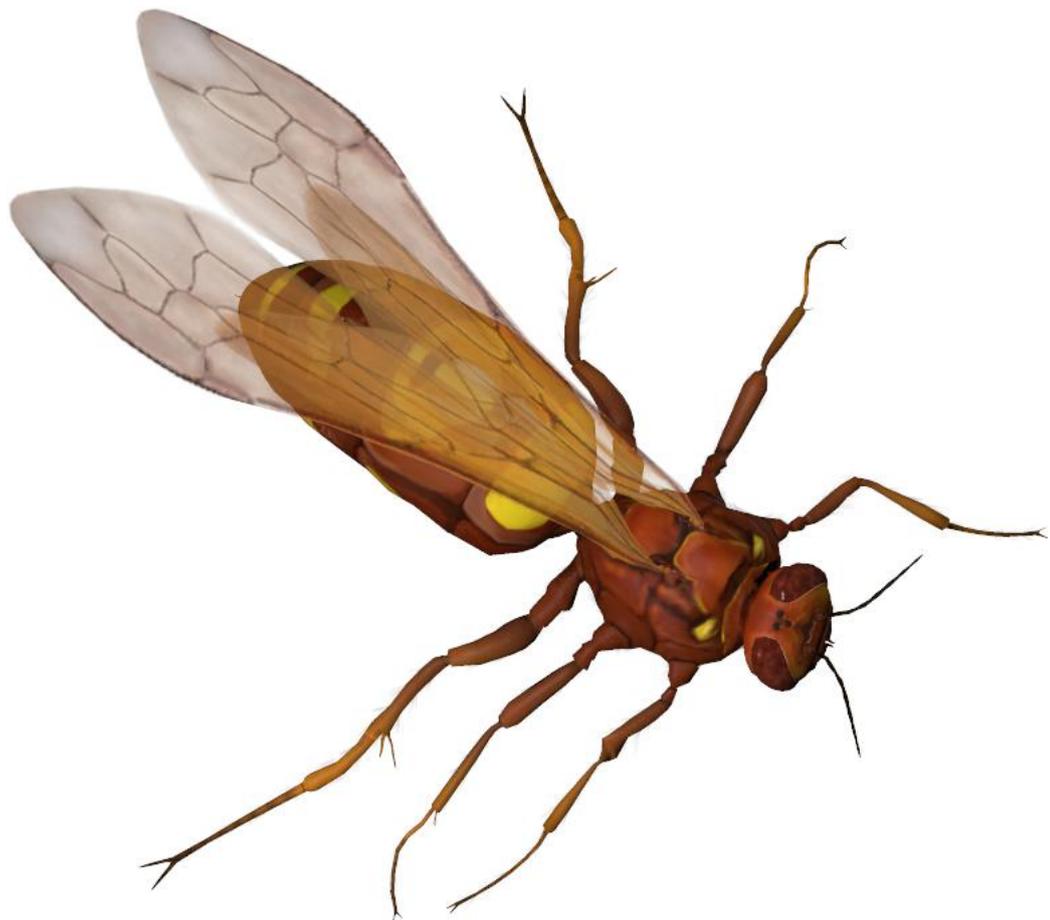
Rarity and Status: This species is not threatened. Due to their painful, venomous stings, the species is considered a pest.

Special Thanks to:

.. to my beta testers, FlintHawk and Carey

Sources:

- Wikipedia (<https://www.wikipedia.org/>)
- Bees, Wasps & Ants Recording Society (<https://www.bwars.com>)
- A Comprehensive Guide to Yellow Stripey Things (<https://kottke.org/18/08/a-comprehensive-guide-to-yellow-stripey-things>)
- Bee Careful (<http://www.bee-careful.com/bee-life/bee-community/>)



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